

## **REMARKS**

The Applicants appreciate the quick and courteous final Action.

Claims 1-12 remain in the application.

Claims 1-12 are elected.

Claims 1-12 are rejected.

No claims are amendeded.

Claims 13-20 are canceled.

### **Restriction Requirement**

The Applicants appreciate the Examiner's acknowledgment of Applicants' election without traverse of claims 1-12 in the reply filed on 27 August 2010. Non-elected, withdrawn claims 13-20 have been canceled herein. Thus, the restriction requirement is rendered moot.

### **35 U.S.C. §102(b) Rejection**

The Examiner has rejected claims 1-12 under 35 U.S.C. 102(b) as allegedly being anticipated by Johannes, US Patent 4053142. Regarding claims 1 and 2, the Examiner contends that Johannes '142 teaches an apparatus for enhancing solubility of a solute in a solvent (abstract; col. 1, line 64 - col. 2, line 13), the apparatus comprising a solvent and/or solute inlet (18 of figure 1; col. 2, lines 54-68) having a fluidizing unit which allegedly creates one vortex of rotating flow in the solute and/or solvent (16 of figure 1; col. 2, lines 1-4 and 41-46 allegedly teach a rotational flow of the first fluid) between the fluidizing unit and a discharge pipe (in mixing chamber 10 of figures 1-2; col. 2, lines 41- 46), allegedly as in claim 1; and in which a fluid interfacial or boundary layer exists within the supposed vortex where enhanced mass transfer, or dissolution of solute into the solvent takes place (abstract; col. 1, line 64 - col. 2, line 13 allegedly teach that this is a feature of the invention when the second component is added), as in claim 2.

Other details of the Examiner's rejection may be had with reference to the 35 U.S.C. §102(b) rejection on pages 2-4 of the non-final Office Action dated 14 September 2010 and the final Action dated 24 February 2011.

In response to the Applicants' amendments and arguments filed 14 December 2010, the Examiner asserted that the Applicants argue that Johannes '801 does not teach a vortex because it does not use the word "vortex" in the description of the invention. While the Examiner agrees that Johannes '801 uses different terminology, the Examiner alleges that it explicitly teaches a device "causing the first fluid to enter said mixing chamber and to assume a generally rotational fluid flow pattern" (col. 2, lines 1-4). The Examiner notes that the Merriam-Webster English Dictionary defines a vortex as "a region within a body of fluid in which the fluid elements have an angular velocity". The Examiner contends that Johannes '801 teaches such a "vortex" as cited above. As such, the Examiner maintains that Johannes '801 teaches a vortex within the normal interpretation of the term.

The Examiner additionally notes that the Applicants further argue that Johannes '801 does not teach the claimed limitations because it teaches two opposing fluid flows. The Examiner agrees that this is, in fact the teaching of Johannes '801. However, the Examiner contends that Applicant's invention as instantly claimed requires only that the solvent or solute form a vortex (see claim 1). The Examiner alleges that Johannes '801 teaches an apparatus in which a vortex is formed in one of the fluids (the first fluid, as cited in the rejection above). The Examiner contends that Applicants' arguments that Johannes '801 teaches two vortices are, as such, irrelevant to the claimed invention, as the one vortex in the solvent and/or solute as taught by Johannes '801, as cited above, is allegedly sufficient to reject the claims as instantly amended.

The Applicants respectfully traverse. A patent claim is anticipated, and therefore invalid, only when a single prior art reference discloses each and every limitation of the claim. *Glaxo Inc. v. Novopharm Ltd.*, 52 F.3d 1043, 1047, 34 U.S.P.Q.2d 1565 (Fed. Cir.), cert. denied, 116 S.Ct. 516 (1995).

The Examiner repeatedly refers to "Johannes '801", however no such reference is of record. Unless the Examiner indicated otherwise, the Applicants will assume that the Examiner intended to refer to Johannes '142, and that the references to Johannes '801 were inadvertent.

The present invention involves an *apparatus for enhancing solubility of a solute in a solvent*, the apparatus comprising *a solvent and/or solute inlet* having a *fluidising unit*

which creates *one vortex of rotating flow in the solvent and/or solute* between the fluidizing unit and a discharge pipe (claim 1). Contrary to the Examiner's contention, claim 1 herein does not require "only that the solvent or solute form a vortex". In addition, the fluidizing unit creates a vortex of rotating flow in the solvent and/ or the solute. This enhances solubility of a solute in a solvent. A "clash", "crash head on" or "tremendous amount of shearing turbulence" as taught by Johannes is not recited or required or desired.

The Applicants respectfully submit that it is factually incorrect to assert that Johannes enhance the solubility of a solute in a solvent by creating a vortex as recited in the present claims. The Examiner contends that Johannes does create a vortex as defined by the *Merriam-Webster English Dictionary*. The definition given by the Examiner is actually the third one. The first three definitions are as follows:

- 1 : something that resembles a *whirlpool*
- 2 a : a mass of fluid (as a liquid) with a *whirling* or *circular* motion that tends to form a *cavity* or *vacuum* in the center of the circle and to *draw toward this cavity or vacuum* bodies subject to its action; *especially* : whirlpool, eddy
- b : a region within a body of fluid in which the fluid elements have an angular velocity (Emphasis added.)

The Applicants respectfully submit that the definition of vortex intended by the Applicants is more squarely within the more common definitions 1 and 2a rather than the less common definition of 2b – it being well known that dictionary definitions are ranked from most common to least common. It is clear that the enhancing solubility is achieved by the vortex, as in the present application, rather than clashing as in Johannes.

The Applicants respectfully direct the Examiner's attention to other definitions of vortex, for instance from V. Neufeldt, Editor in Chief, *Webster's New World College Dictionary Third Edition* (1997), Macmillan, New York, p. 1497:

- 1 a *whirling* mass of water forming a *vacuum at its center*, into which anything caught in the motion is *drawn*; *whirlpool*
- 2 a *whirl* or powerful eddy of air; *whirlwind*
- 3 any activity, situation, or state of affairs that resembles a *whirl* or eddy in its rush, absorbing effect, catastrophic power, etc. (Emphasis added.)

Please also see freedictionary.com:

### **vortex**

A circular, *spiral*, or *helical* motion in a fluid (such as a gas) or the fluid in such a motion. A vortex often forms around areas of low pressure and *attracts the fluid* (and the objects moving within it) *toward its center*. Tornadoes are examples of vortices; vortices that form around flying objects are a source of turbulence and drag. (Emphasis added.)

The Johannes nonmechanical shearing mixer does not use a vortex. The Abstract is instructive:

A nonmechanical shearing mixer *uses fluid velocity to create sufficient **turbulence** to completely mix two fluid components*. Mixing is accomplished in an annular mixing chamber defined by inner and outer cylindrical walls. A first fluid is forced under pressure outwardly through openings in the inner cylindrical wall, the openings being oriented and arranged to cause the first fluid passing therethrough to undergo *a generally rotational fluid flow pattern* in the annular mixing chamber. A second fluid entering the annular mixing chamber through openings in the outer cylindrical wall is similarly caused to undergo *a generally rotational fluid flow pattern but in the opposite direction of the rotational fluid flow pattern of the first fluid*. The two opposing rotational fluid flow patterns thus “clash” in the annular mixing chamber and create *a large amount of **turbulence** and shearing action resulting in effective and complete mixing of the two fluids*. The mixed fluid components are continuously discharged from the annular mixing chamber. (All emphasis added.)

Thus, while the first fluid and second fluid of Johannes are caused to undergo generally rotational fluid flow patterns, it is not these rotational fluid flow patterns that mix the fluids. What mixes the fluids is the “clash” of the two fluid flow patterns – such clash creates “a large amount of turbulence and shearing action resulting in effective and complete mixing of the two fluids”. No vortex or rotational fluid flow patterns are involved in the actual mixing. It is the clash of these patterns and the “large amount of turbulence and shearing action” that causes the mixing of the fluids.

In contrast, Johannes does mention vortices, but only describes the existence of vortices in the discussion of *prior art*. In column 1, lines 32-41, Johannes discusses U.S.

Pat. No. 2,653,801 and states: “Since only one of the liquid components undergoes a cyclonic flow pattern, the ‘passive’ liquid added to the *vortex* readily flows with the rotating liquid, thereby *reducing mixing effectiveness*” (emphasis added) where it is clear that Johannes finds the adding of a so-called passive liquid to the vortex as having reduced mixing effectiveness. Further, in column 1, lines 42-57, Johannes notes “U.S. Pat. No. 3,261,593 discloses fluid mixing apparatus wherein a first liquid enters a first cylindrical chamber through a first tangential inlet tube, the first liquid thus creating a *swirling vortex* in the first chamber.” (Emphasis added.) Thus, the Applicants respectfully submit that Johannes was well aware that mixing apparatus such as these prior art devices may create a vortex, but Johannes does not disclose, hint or suggest that his shearing mixer creates a vortex, directly contradicting the Examiner’s assertion. If his mixer created a vortex Johannes would certainly have known and described it as such. Indeed, it is clear that Johannes considered *and rejected* these prior art apparatus that used a vortex and instead invented a nonmechanical shearing mixer that does not use vortexes.

Indeed, the Applicants respectfully submit that because of the above facts, Johannes *teaches away from* using vortexes. “A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.” *Ricoh Co., Ltd. V. Quanta Computer Inc.*, 550 F.3d 1325, 1332 (Fed. Cir. 2008) (quoting *In re Kahn*, 441 F.3d 977, 990 (Fed. Cir. 2006)).

Because the original claim language specifically requires “a fluidising unit which creates a vortex” and the single prior art reference does not disclose this limitation, the present rejection must fail for this reason alone. The single prior art reference only discloses vortexes with respect to the prior art which Johannes considered and rejected in favor of a nonmechanical shearing mixer that does not use vortexes.

Further evidence that a vortex is not created by the Johannes mixer may be seen with reference to what *is* created by the Johannes mixer. Besides the Abstract of Johannes, discussed above, the Examiner’s attention is additionally directed to column 2, lines 54-58 of Johannes which presents a similar disclosure to the Abstract, although slightly different words are used: “In the annular mixing chamber **10**, therefore, the rotational fluid flow patterns of the first and second fluid components (clockwise and counter-clockwise

respectively) *crash head on and create a tremendous amount of shearing turbulence.*” (Emphasis added.) Again, there is no disclosure that a vortex is created, but what is disclosed as created is a “tremendous amount of shearing turbulence” caused by “the first and second fluid components (clockwise and counter-clockwise respectively)” crashing head on. This is not the claimed apparatus, which apparatus creates a vortex. In contrast, Johannes’s mixer creates shearing turbulence by crashing rotational fluid flow patterns from opposite directions. In this shearing turbulence there is no rotational flow and no vortex. The mixing in Johannes is accomplished by the “clash”, crashing the rotational flows “head on” and “shearing turbulence” – not by a vortex as created by the instant, claimed apparatus.

Additionally, the Applicants again respectfully direct the Examiner’s attention to the fact that claim 1 herein now recites “one vortex”. The Examiner’s attention is respectfully directed to page 12, lines 24-25 of the instant application which also provides support for this amendment: “Figure 4 is a CFD image of the inverted vortex flow from fluidising apparatus of Figure 1”, as well as page 14, lines 16-28:

Figure 4 shows that the *swirling exiting fluid* (solvent) from the HydroTrans head produces an inverted *vortex at the entry to the discharge pipe*, which is considered to be fairly stable under normal velocity flow conditions, resulting in enhanced mobilisation of solids surrounding the HydroTrans head. The vortex generally has a low pressure core or zone compared to that of the rotating liquid around it (see Figure 3). This can create a boundary layer of liquid rotating around this core where the core’s pressure may be close to the vapour pressure of the liquid (solvent) being used thus allowing the water at this point to become excited leading potentially to cold boiling. (Emphasis added.)

As noted, Johannes discloses not one but *two* rotational fluid flow patterns which are opposing to one another and “clash” or “crash” into one another, creating a large amount of turbulence which is no longer rotational but turbulent and *not* creating a vortex. Thus, the Applicants respectfully submit that Johannes does not disclose each and every limitation of the amended claims for this additional reason taken alone, and especially when taken together with the distinction previously established above.

The Applicants again respectfully direct the Examiner’s attention to the fact that claim 1 now recites that the vortex created is of rotating flow, and which vortex of rotating

flow is between the fluidising unit and the discharge pipe (in one non-limiting embodiment, discharge pipe **130**). Thus, claim 1 now requires that the fluidising apparatus creates one vortex of rotating flow in the solvent and/or solute between the fluidising unit and the discharge pipe, which such vortex Johannes is completely silent upon, even though he was aware that prior mixing apparatus created swirling vortexes, but rejected an apparatus that would create a vortex and instead created a shearing mixer that differently mixes a first fluid and a second fluid via clashing, crashing head on and shearing turbulence. The Applicants respectfully submit that because Johannes was acquainted with vortexes, as shown by his descriptions of them with respect to the prior devices, he would have realized if his shearing mixer created one, and would have described it as such. However, since it is not described, one having ordinary skill in the art must thus conclude that the Johannes mixer does not create vortexes of any kind, much less the type described in the amended claim. One having ordinary skill in the art would also expect Johannes to describe a vortex in his device as such if it were occurring. The *absence* from the reference of an explicit claim requirement cannot be reasonably construed as establishing that the requirement is in the reference, see *In re Evanega*, 829 F.2d 1249 (Fed. Cir. 1987). Indeed, a more reasonable conclusion is that established above, that Johannes considered apparatus that creates a swirling vortex *but rejected them* in favor of his shearing mixer that does not use a vortex.

The Applicants thus respectfully submit that Johannes does not teach or disclose “a fluidising unit which creates one vortex of rotating flow in the solvent and/or solute between the fluidising unit and a discharge pipe” as required by present claim 1 (and thus all claims dependent thereon), and thus because the single prior art reference does not disclose each and every limitation of the amended claim in these several aspects, the Applicants respectfully submit that the instant rejection should be withdrawn. Reconsideration is respectfully requested.

#### Request for Entry of Amendment

The Applicants would respectfully request that the instant Amendment be entered under 37 CFR §1.116(b): “Amendments presenting rejected claims in better form for consideration on appeal may be admitted.” It is respectfully noted that non-elected, with-

drawn claims 13-20 have been canceled herein. This greatly simplifies and narrows the issues on appeal, should appeal be necessary. Indeed, the cancelation of these claims places them in better form for consideration on appeal, if necessary. It is respectfully submitted that for this reason, which simplifies and narrows the issue, the instant Amendment should be entered.

Finally, the Applicants respectfully submit that the instant amendments have the possibility, indeed probability, of placing the claims in immediate condition for allowance and this fact alone necessitates the entry of this amendment. Entry of the instant amendment would thus conserve the resources of the Office and the Applicants.

It is respectfully submitted that the arguments presented above place the claims in condition for allowance. Reconsideration and allowance of the remaining claims are respectfully requested. The Examiner is respectfully reminded of his duty to indicate allowable subject matter. The Examiner is invited to call the Applicants' attorney at the number below for any reason, especially any reason that may help advance the prosecution.

Respectfully submitted,  
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